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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/810,419

03/26/2004

Lahir Shaik Adam

TI-36390

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05/25/2006

TEXAS INSTRUMENTS INCORPORATED

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EXAMINER

DANG, PHUC T

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 05/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/810,419

Applicant(s)

ADAM ET AL.

Examiner

PHUC T. DANG

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on amendment filed January 20, 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 18-25 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-17 is/are allowed.
- 6) ☒ Claim(s) 1-5, 7 and 8 is/are rejected.
- 7) ☒ Claim(s) 6 and 9 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

1. The indicated allowability of claims 1-25 have withdrawn in view of the newly discovered reference(s) to Houlihan et al. (US 6,258,673 B1). Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 1 and 8 are rejected under 35 U.S.C. 102 (b) as being anticipated by Houlihan et al. (U.S. Patent No. 6,258,673 B1).

Regarding claim 1, Houlihan et al. discloses a method of fabricating a tri- comprising:

forming a high voltage gate dielectric layer (22, Fig. 4) over a semiconductor substrate (10, Fig. 1) of the tri-gate semiconductor device;

implanting a low dose of nitrogen (N, Fig. 2) into the semiconductor substrate (10, Fig. 2) in a low voltage core region (400, Fig. 2);

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forming a low voltage core gate dielectric layer (28, Fig. 4) over the low voltage core region (400, Fig. 2), including forming an intermediate core gate dielectric layer (22, Fig. 4) over an intermediate core region (100, Fig. 4).

Regarding claim 8, Houlihan discloses a step of further including forming a first gate over the high voltage gate dielectric layer (24, Fig. 4), forming a second gate over the low voltage core gate dielectric layer (28, Fig. 4) and forming a third gate over the intermediate core dielectric layer (22, Fig. 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 2-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Houlihan et al., (U.S. Patent No. 6,258,673 B1).

Regarding claims 2-3 and 7, Houlihan et al. discloses the low dose of $1 \times 10^{15}/\text{cm}^2$ at a voltage 5 keV[col. 3, lines 60-63], while Applicants claimed the ranges from 5×10^{13} ions/cm² to 5×10^{14} ions/cm² at 1 keV to 100 keV.

However, the selection of the claimed process parameters would have been obvious to one having ordinary skill in the art at the time the invention was made to perform the low dose of nitrogen within the claimed range, since it is well settle that when the general conditions of a

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claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claims 4-5, Houlihan et al. discloses the thickness of the low voltage core gate dielectric layer is 1.06 times the thickness of the high voltage core gate dielectric layer and the thickness of the intermediate voltage core gate dielectric layer ranges from 1.0 to 6.5 nm [col. 4, lines 46-53], while Applicants claimed the ranges the thickness as shown in claims 4-5.

However, the selection of the claimed process parameters would have been obvious to one having ordinary skill in the art at the time the invention was made to perform the thickness of the core gate dielectric layers within the claimed range, since it is well settled that when the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Allowable Subject Matter

4. Claims 10-17 would be allowed.

The following is a statement of reason for the indication of allowable subject matter:

Claims 10-17 are considered allowable since the prior art of record and the considered pertinent to the applicant's disclosure does not teach or suggest the claimed invention having a step of forming interconnects extending through dielectric layers located over first, second, and third transistor gates to interconnect the first, second and third transistor gates to form an operative tri-gate integrated circuit as cited in claim 10.

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Claims 6 and 9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

None of the Prior art of record teaches or suggests forming the low voltage gate dielectric layer and the intermediate core dielectric layer is conducted in the presence of an environment containing nitrogen as cited in claim 6 and forming the second gate includes forming the second gate such that a concentration of nitrogen within the second gate is substantially uniform through the second gate as cited in claim 9.


Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phuc T. Dang whose telephone number is 571-272-1776. The examiner can normally be reached on 8:00 am-5:00 pm.

6. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Nelms can be reached on (571) 272-1787. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9306 for regular communications and Final communications.

7. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Phuc T. Dang



Primary Examiner

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